



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,425	11/20/2003	Chi-Long Tsai	3183/49	6970

23338 7590 03/30/2005

DENNISON, SCHULTZ, DOUGHERTY & MACDONALD
1727 KING STREET
SUITE 105
ALEXANDRIA, VA 22314

EXAMINER

PERT, EVAN T

ART UNIT PAPER NUMBER

2826

DATE MAILED: 03/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/716,425

Applicant(s)

TSAI ET AL.

Examiner

Evan Pert

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-18 is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1103.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The specification (pages 1-7) contains grammatical informalities throughout. While applicant may certainly choose any linguistic style, the style of choice should be grammatically correct in English, to be in definite compliance with 37 CFR 1.71, and to avoid the need for the filing of a Certificate of Correction after issuance of a patent.

Informalities include awkward word choices such as at page 1, line 3, where “relating” should preferably read -related— and at line 9, where “type” should preferably read -form--.

Other grammatical informalities are more awkward, such as at lines 15-18, where the sentence is grammatically improper in English or was poorly translated from the priority document .

Some words could simply be deleted to correct the informality, such as at p. 1, line 23, where “on” is superfluous.

Other informalities relate to pluralities or verb tense, such as at p. 1, line 26 where “in position” should read -in positions—and at line 27 where “are” should read -is--.

Art Unit: 2826

While the conceptual aspects of the specification are readily apparent and comprehensible to those of skill in the art and patent prosecution, the English translation of the specification submitted does not seem to be an exact translation of the priority document, or the priority document contains informalities as well.

Applicant is requested to review the specification for identification and correction of all informalities, and is required to submit a substitute specification in response to this Office Action.

Allowable Subject Matter

3. Claims 1-18 are allowed.
4. The following is a statement of reasons for the indication of allowable subject matter:

Utility - The prior art does not disclose applicant's claimed methodology, which is particularly useful for forming bumps on semiconductor devices wherein the bumps have more equivalent footprints than prior art techniques using dry film, for example.

Novelty - Applicant's claimed invention can be distinguished from prior art by the use of a first "photoresist" (preferably a "dry film" photoresist) and a "second photoresist" (preferably a "liquid photoresist"), wherein the "second photoresist" is "formed in openings of the first photoresist," is "exposed and developed" and is "for modifying the openings in the first photoresist."

Art Unit: 2826

Practice - In an exemplary embodiment, a dry film is used as the first resist, wherein during the act of creating openings in the dry film (e.g. 231), the openings end up having an undesirable reentrant portions (e.g. undercut portions 232), and wherein the second photoresist is preferably a liquid photoresist that fills in the reentrant portion (e.g. 261), such that the bumps have a uniform footprint [e.g. Figs. 2G and 2H].

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 2004/0259345 A1 to Yu et al. is cited as related for disclosing reentrant portions in openings (20) of a dry film (18), but does not disclose use of a "second photoresist" or a "liquid photoresist" to fill the gap at the bottom of the opening (i.e. the reentrant portion gap that laterally extends beyond the edge of the opening as seen from above).

US 5057453 to Endo et al. is cited for disclosing the use of reentrant portions in openings of a dry film to create a conductive "skirt" (16a) around the base of the bump (16), which is a contradiction to applicant's invention that teaches the skirt of the Endo et al. reference as an "undesirable" characteristic of the "prior art" [e.g. applicant's Figs. 1A-1B].

Formal Matters Outstanding

6. This application is in condition for allowance except for the formal matter of submitting a substitute specification definitely in compliance with 37 CFR 1.71 and that does not require a Certificate of Correction after becoming a patent.

Art Unit: 2826

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.


A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


EVAN PERT
PRIMARY EXAMINER

ETP
March 25, 2005